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The Routine Examination of Cows for the Detection of Tuberculosis—a Survey of the Published Results

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At the present time when schemes affecting the whole-time veterinary service are, according to the popular Press, being considered, it may be of advantage to devote some attention to such facts as are available and any deductions which may reasonably be assumed from their study.

Examination of the results of the routine inspection of dairy cattle is very misleading unless the results obtained in each county are reduced to a common basis for comparison. For this purpose the most convenient to adopt is the number of tuberculous cows detected per 10,000 cows examined on routine inspection under the Milk and Dairies and Milk (Special Designations) Acts and Orders. Several reasons, however, prevent exact comparisons. For instance, the variations in the frequency of the inspections in different counties may account for slight differences in the proportion of tuberculous cows detected. The more frequent the inspections the higher will be the percentage of tuberculosis as estimated on the cow population but the lower will be the incidence as calculated per number of cows examined. Exact comparison of the work of different counties is also rendered much more difficult by the great variations in the data published in the different reports and the methods of presentation. In a few all the requisite data are clearly set out; in others appreciation of what may be good work is prevented by deficiencies in the details and figures published. On the other hand, some reports are set out in such a manner as inevitably to arouse the suspicion of being written with the intention of creating an unjustifiably good impression. This could be overcome by the adoption of an approved system of reporting under the Diseases of Animals and Milk and Dairies Acts and Orders.

Further objection may be raised to the comparison of the results of routine inspection in different counties on the number of tuberculous cows detected because views may be held that tuberculosis is less prevalent in certain counties. This may be so, but in the absence, at present, of any definite evidence to this effect, and in the presence of some evidence to the contrary in certain instances (namely, the relatively high number of reported cases compared with the cases detected on inspection, and also the low proportion of "Not advanced" cases in the cows slaughtered) it may, for the present, be useful to adopt this basis for comparison of the results obtained.

In analysing such annual reports of county veterinary officers as were available it was necessary to estimate the number of cows examined per veterinary officer in each county. In obtaining this figure the Chief Veterinary Officer is estimated as having participated in the work equally with the assistants where the total professional staff does not exceed three; but where the staff numbers four or more the Chief is estimated as not having participated in routine inspection unless information in the report contra-indicates this supposition. As precise information is frequently lacking as to the amount of routine work undertaken by the chief veterinary officers the figures in this column may be only relatively correct in certain cases.

In Table I (*overleaf*) account is also taken, so far as is possible, of the other duties of the whole-time veterinarians—as published in each report. In the case of certain counties where the partition of duties between whole- and part-time officials is not clear or the number of the staff is vague certain calculations are impossible and have been omitted. The number of the staff is obtained, where possible, from the report quoted or from the appropriate list in the Register of the Royal College of Veterinary Surgeons.

With regard to the number of cows examined per veterinary officer in Kent it is the writer's considered opinion that the average of 21,000 cows per annum is more than can be examined thoroughly without considerable hardship. It is considered necessary to emphasise this lest, in view of the relative success of the inspections performed in this county, the number of cows examined should be considered as suitable for adoption elsewhere.

It may be seen from a study of Table I that the best results, as judged by the ratio of tuberculous cows detected on inspection, have been obtained by those counties examining annually the more moderate and lower numbers of cattle

Table I.

County and Year of Report.	Staff.	Number of Cows Examined M. & D. and M. (S.D.) O.	Number of Cows Examined per Veterinary Officer.	Micro-scopic Exami-nations.	Micro-scopic Exami-nations per Veterinary Officer.	Other Duties of Whole Time Veterinary Officers.	Tuber-culous Cows Detected on Routine Inspec-tion.	Tuber-culous Cows Detected following Reports*	Total of Tuber-culous Cases dealt with.	Total Tuberculous Cows.		
										Udder.	Chronic Cough.	Emaci-ation.
1. Kent, 1936	4	65,705	21,900 Ex.	3,496	1,165 E.	M. & D. D. of A.	498	53	551	216	295	40
2. Notts, 1935-6	5	47,797*	11,950 Ex.	2,648	662 E.	M. & D. D. of A. Markets Bacterial examination of milk samples†	305*	163	478	121*	327*	30*
3. Staffs, 1935	7	138,268	23,000 Ex.	None	None	M. & D. T.B.O.	788	790	1,733	509	974	250
4. Durham, 1935	5	58,971	14,750 Ex.	1,813	Mostly at head-quarters	M. & D. D. of A. Markets	227	155	382	127	250	5
5. Oxford, 1936-7	1	7,048	7,048 I.	?	?	M. & D. D. of A.	25	183	208	53	52	104
6. Hereford 1934-5	2	9,068	4,600 I.	Details not given		M. & D. D. of A. Markets	30	47	76	6	48	22
7. Yorks. (W.R.) 1935-6	9*	213,933	26,700 Ex.	3,003	375 E.	M. & D. D. of A. Markets	572	616	1,192	428	608	152
8. W. Sussex 1935-6	5	74,310	18,600 Ex.	1,167	?	M. & D. D. of A. Tuberculin Testing	190	151	341	77	179	85
9. Lanark, 1935	?	96,389	?	1,494	?	M. & D. T.B.O.	244	177	419	120	264	47
10. Wilts, 1935	5	143,046	35,900 Ex.	111	—	M. & D. T.B.O.	353	59	412	154	258	
11. Cheshire, 1935	11	144,026	14,400 Ex.	3,567	356 E.	M. & D. T.B.O.	348	651	1,271	529	265	461
12. Essex, 1936	?	At least 180,000*	?	None	None	M. & D. D. of A. Markets	417	446	863	178	572	113
13. Berks, 1935	2	50,434	18,000 I. (approx.)*	Only Sputa	—	M. & D. T.B.O.	94	112	206	51	108	47
14. Bedford, 1936	1½	19,807*	19,800 I.	228	114 I.	M. & D. T.B.O.	39	30	71	13	51	7
15. Cumberland, 1936	4	48,539	16,200 Ex.	902	330 E.	M. & D. D. of A.	93	143	237	41	143	52
16. Surrey, 1935	4	83,000* (approx.)	20,900 I.	None		M. & D. D. of A. Markets	116	48	164	59	85	20
17. Ayr, 1935	6	97,298	19,500 Ex.	—	—	M. & D. D. of A.	125 (approx.)	?	265	56	163	46
18. Midlothian, 1935	2	17,475	8,700 I.	274	137	M. & D. D. of A. Meat Inspection	18	36	54	8	43	3
19. Somerset, 1936	2	31,285*	?	?	?	M. (S.D.) O.–New applicants Tuberculin Testing	28*	252	280			Details
20. Wigtown, 1936	1½*	53,266	35,000 I	71	—	M. & D. D. of A.	38	259	297	27	159	111

Abbreviations——
D. of A.—Diseases of Animals Acts and Orders. M. & D.—Milk and Dairies Acts and Orders. M. (S.D.) O.—Milk (Special Designations) Order. I.—Inclusive, *i.e.*, of Chief Veterinary Officer. Ex.—Exclusive, *i.e.*, of Chief Veterinary Officer.
R.I. or Rout. Insp.—Routine Inspection under the Milk and Dairies and Milk (Special Designations) Orders. Av.—Average.

Table I (*continued*).

Tuberculous Cows Detected on Routine Inspection.			Tuberculous Cows Detected following Reports.*			Percentage "Not Advanced" on *Post-mortem* Examination.	Tuberculous Cows Detected per 10,000 Examined on Routine Inspection.	Average Valuation of Cows Killed.	Average Compensation of Cows Killed.	Average Salvage of Cows Killed.	Tuberculous Udders.		Total Tuberculous Udders per 10,000 Cows of Total Cows Examined.	Remarks. (*By Owners or their Veterinary Surgeons.)
U.	C.	E.	U.	C.	E.						Preliminary Reports.	Post-mortem Reports.		
								£ s.	£ s.					
214	268	17	3	27	23	46	75	—	6 4	16/6			33	
93*	202*	10*	21	122	20	59	64	—	—	—			25*	*Including herd sampling, re-examinations, etc. †Bacterial counts.
328	Details not given.					47	57	—	4 16	31/6	503	721	37	
95	129	3	32	121	2	28	38	6 15	4 19	15/–			22	
	Details not given.					39	36	—	3 13	9/3	53	82	36	
		"	"	"		40	33	7 14	3 12	9/6			6·6	
284	257	31	144	351	121	35	27	9 7	4 10	21/–			20	*Excluding 1 Veterinary Officer on sheep scab duty.
75	1	15	2	1	49	41	26	7 16	4 2	?			10	
110	126	8	10	138	29	52	25	—	—	—			12	
	Details not given.					33	24·7	—	—	—	154	184	12	
		"	"	"		28	24	8 3	3 19	17/6			30	
153	231	33	25	341	80	57	23 (approx.)	—	6 4	7/6	178	332	10	*Computed from figures given in Report.
	Details not given.					36	19	7 4	3 4	9/6			12	*Computed from Report—two of accredited examinations being done by Practitioners.
10	27	2	3	24	5	21	19	6 10	2 12	10/2			6·5	By two Veterinary Officers in 6 months.
28	53	12	13	90	40	54	19	6 15	3 18	7/–		*	7·6	
56	Details not given.					48	14	—	5 19	—	59	72	7·1	*20,862 cows examined quarterly.
		"	"	"		31	13 (approx.)	—	4 1	22/6	55	67	6	
		"	"	"		—	10	—	—	—			5	
not given.						44	9	—	3 17 6	9/4			—	*Accredited herds only.
	Details not given.					29	7	—	—	—			5	*One V.O. for 6 months. Two V.O.s for 6 months.

Micro.—Microscopic. Exam.—Examination. V.O.—Veterinary Officer (whole time). U.—Tuberculosis of the Udder, *i.e.*, as classified for slaughter under the Tuberculosis Order, 1925. C.—Chronic Cough, etc., as classified for slaughter under the Tuberculosis Order, 1925. E.—Tuberculous Emaciation, as classified for slaughter under the Tuberculosis Order, 1925. * or †.—See last column in same line for explanatory note. T.B.O.—Tuberculosis Order of 1925.

per veterinarian. For instance, the average number of cows examined per veterinary officer for the first six counties in the Table is 16,000 and the number of tuberculous cows detected per 10,000 is 57. On the other hand, the average for the remaining counties (excepting Lanark, Essex, Ayr and Somerset, for which the exact figures cannot be obtained) is 21,000 cows per veterinary officer and the tuberculous cows detected are 22 per 10,000 cows examined. This is set out in Table 2.

Table II.

	Cows Examined per Veterinary Officer.	Tuberculous Cows Detected per 10,000 Examined.
Average for Counties 1 to 6 in Table I	16,000	57
Average for Counties 7 to 20 (excepting 9, 12, 17 and 19) ...	21,000	22

As more definitely controlled evidence on this point the following may be quoted (Steward, 1936): "The following figures from my own work will, I think, show the influence of the numbers of cows examined daily on the success of inspection in the two districts compared, comprising approximately 10,000 cows in each district. The total incidence of udder tuberculosis was very similar, being one tuberculous udder in 270 and 230 cows respectively, and the identical methods of inspection and examination were performed except for the limitations imposed on time by the higher numbers. In one district, at the rate of 60 cows per day, 35·6 per cent. of tuberculous udders remained undetected clinically (though detected later, of course, by herd sampling) and in the other district where the cows examined rose to 90 per day, 51·6 per cent. of tuberculous udders were missed clinically, and further, the number of tuberculous cows detected and slaughtered fell from 1 per 100 to 1 per 150 cows examined. It is interesting to note that these figures appear to bear a close proportional relationship to the number of cows inspected." The rates of inspection referred to were 12,000 and 18,000 cows per annum.

It is the writer's opinion that the clinical examination of from 12,000 to 15,000 cows per annum with the microscopic examination of samples and the usual duties under the Diseases of Animals Acts and Orders is the absolute maximum that can be performed efficiently by each veterinary officer. In fact, if the terms of the Milk and Dairies Orders are to be enforced conscientiously it is probable that such a number of cows is greater than can be coped with efficiently.

The Microscopical Examination of Samples

A study of Table 1 will furnish support for the belief that the best results are obtained where the microscopic examinations of samples are made by the veterinarians making the clinical examinations. There are several reasons which may account for this, namely:—

(1) The greater interest that is attached to the examination of samples from animals that have been examined by the microscopist who has the advantage of being able to correlate the syndrome of each case with the microscopic appearance of the sample. This most valuable experience is lost if divided between two workers.

(2) The limitation that must be imposed on the number of cows examined clinically where microscopic examinations are performed by the veterinary officer himself. For instance, where the veterinarian does not perform his own laboratory work he might be expected to conduct clinical examinations both morning and afternoon. This entails considerable monotony and physical strain when carried out over a period of time and is bound to react unfavourably on the results obtained. This factor will become of less importance as the duties of veterinary officers become more varied.

(3) There is less likelihood of error where the responsibility is on one head rather than divided between two.

(4) Delay in examination is deleterious to the cell content of milk samples—the cell content being of great significance and value in the microscopic examination of milk samples for evidence of tuberculosis.

This factor of time is probably of prime importance and may account for the moderate results obtained from the microscopic examination of samples of milk that are not examined by the veterinarian collecting the sample. Concrete evidence in support of this and the factors mentioned under (3) and (1), namely, the value of being able to combine in one person the responsibility and the clinical and microscopic experience of each and successive cases (*i.e.*, the accumulation of experience), appears to be available in the Wiltshire and Berkshire reports. In both of these counties it seems that the individual samples of milk from suspected cows are sent away for microscopic examination and if negative microscopically are submitted to biological examination.

In Wiltshire, 99 milks were found to be positive microscopically and 55 biologically. In Berkshire it would seem that at the most only 16 out of 30 tuberculous milk samples were detected microscopically, the remainder having to be submitted to the biological test. From the figures of these two counties it may be seen

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The Ministry desires to inform members of the Veterinary Profession that it has received authority to reduce its charges for the above-mentioned services as from 15th May, 1937, as follows:—

Poultry-Blood agglutination test for the detection of carriers of Bacillary White Diarrhœa: 1½d. per sample (reduced from 2d. per sample).

Fowl-Pox Vaccine: 1s. 9d. for 30 doses (minimum quantity supplied), thereafter 6d. for 10, or part of 10 doses, *e.g.*, 5s. 3d. for 100 doses; £2 10s. for 1,000 doses.

The charges for *post-mortem* examination and for the supply of Fowl Typhoid vaccine remain unaltered, *viz.*:—

Post-mortem examination of rabbits and adult birds, 3s. per specimen.

Post-mortem examination of chickens (this fee covers whatever work is necessary for the purpose of making a diagnosis irrespective of the number of chickens examined) 5s.

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that 37 per cent. of tuberculous separate samples of milk were missed on microscopic examination. Such a result is inferior to what might reasonably be expected from veterinary officers performing their own microscopic examinations.

The only (accessible) comparable figures published by veterinarians are those of Torrance as far back as 1922 and 1932. In the 1922 publication the percentage of tuberculous milks detected microscopically was 84·7 per cent. (*i.e.*, 61 detected microscopically and 11 biologically)—such a figure must be regarded as excellent for 1922, which was in the early days of the Cell Group Method of examining milks (described by Torrance in this article). At the later date (1932) the figures indicate 94 per cent. of tuberculous milk samples as having been detected microscopically (79 microscopically and five biologically).

Table III.

	Total Tuberculous Milk Samples.	Number Found Positive on Microscopic Examination.
Wiltshire	154	99
Berkshire	30	16
Total	184	115 (63 per cent.)
Torrance (1922)	72	61
„ (1932)	84	79
Total	156	140 (90 per cent.)

Examination of the results obtained in Nottinghamshire and Kent (Table 1) indicates that the more samples examined microscopically the greater is the number of tuberculous cows detected.

Table IV.

Microscopic Examinations.

County.	Milks. (Total.)	Milks. (Positive.)	Sputa. (Total.)	Sputa. (Positive.)
Bedford ...	203	8	25	8
Cheshire ...	3,225	557	342	229
Cumberland	333	41	463	139
Notts ...	1,497	111	992	243
Yorks. (W.R.)	2,040	331	867	298
Essex ...			135	52
Totals ...	7,298	1,048 (14·4 per cent.)	2,824	969 (34·3 per cent.)

Table 4 shows the results of microscopic examinations in six counties and the percentage of positive results following the examination of samples of milk and expectorate respectively.

It is obvious from Table 4 that the examination of samples of expectorate is followed by a higher percentage of positive results than the examination of milk samples. The reason for this is probably that the commonest disease of the lungs causing expectoration is tuberculosis, whereas the commonest disease affecting the udder and inducing sampling is probably a pre-existing mastitis.

In a majority of cases the first sign of tuberculosis of the lungs is cough or expectoration and in many cases no other clinical evidence is detectable for a long time. Therefore the more samples of expectorate examined, irrespective of the clinical condition of the cow, the greater the number of tuberculous cows detected.

In this connection it is surprising how few samples of expectorate are examined in counties where the veterinary officers do not perform their own microscopic examinations themselves —*e.g.*, Essex (1936) only 135 samples of sputum examined; Surrey (1935) 53 samples and Wiltshire (1935) 111 sputa (examined by two veterinary officers only).

The Limitations of Routine Inspection

(1) *Can bovine tuberculosis be reduced by routine inspection?*

The results of inspection over periods of six and nine years respectively are set out in Table 5—not as an answer to the above question but as an indication that as performed in these counties inspection has as yet failed to reduce the incidence of the disease in cattle. There can be little doubt, however, that the incidence of infection of the milk must have been reduced in these districts.

Where routine inspection is combined with regular herd sampling the infection of the milk supply can be kept at a minimum and it will be interesting to observe the effect of careful routine inspection combined with herd sampling, as performed in Nottinghamshire, on the incidence of tuberculosis in cattle in ten years' time.

There are two points in the pathogenesis of the disease which operate against the probable success of routine inspection in reducing the incidence of tuberculosis in cattle to any extent within a reasonable period of time. These are—

(*a*) The fact that a cow slaughtered for open tuberculosis to-day may have infected young cattle which may not show detectable clinical evidence of the disease for four or five years and for some of that time may have been infective for other cattle.

Table V.

County.	Total Cows Examined (M. & D.).	Samples Examined Micro-scopically.	Total Tuberculous Cows Killed.	Tuberculous Cows Killed.		Tuberculous Cows Detected per 10,000 Examined on Routine Inspection.
				Routine Inspection.	Reports.	
Cumberland, 1928	9,916	69	152	15	137	15
„ 1929	9,915	91	143	17	126	17
„ 1930	16,784	252	139	27	112	16
„ 1931	20,367	356	183	43	140	21
„ 1932	31,118	409	202	49	153	16
„ 1933	30,857	569	259	89	170	29
„ 1934	48,388	608	235	90	145	19
„ 1935	44,739	716	224	82	142	18
„ 1936	48,539	902	237	93	144	19
Yorks. (W.R.)—						
1st Report	34,000	—	898	104	794	30
2nd „	100,654	704	809	204	605	20
3rd „	156,334	1,370	832	387	445	25
4th „	171,580	1,185	923	396	524	23
5th „	175,869	1,844	1,143	516	621	29
6th „	187,831	2,417	1,188	703	482	37
7th „	191,828	3,405	1,173	609	561	32
8th „	195,104	2,762	1,145	590	548	30
9th „	213,933	3,003	1,192	572	616	27

(*b*) That at any time acute generalisation of tuberculosis may arise from a minute and apparently inactive lesion of tuberculosis. Such cows within a few weeks of being quite uninfective to other cattle may become gravely infected and dangerous disseminators of infection as, for instance, where miliary tuberculous infection of the lungs or uterus or infection of the udder has occurred from a small lesion in an internal gland or organ.

These two reasons, in the writer's opinion, render it improbable that the routine inspection of dairy cattle can be of much immediate service in the eradication of the disease. (It has, of course, a definite agricultural value in that many cases of tuberculosis are detected before they have progressed to a wasteful degree.) Furthermore, there can be no doubt that where properly performed in conjunction with herd sampling it can be of the greatest value for the protection of the milk consuming public and the safety of the milk supply.

2. *The Necessity of Controlling Inspection by Herd Sampling.*

The limitation of clinical methods for the detection of tuberculous udders may be judged by an examination of the published results of investigations of known tuberculous milk supplies under Section IV of the Milk and Dairies (Consolidation) Act, 1915. If a group sample proves to be tuberculous it may be taken as indicating that the cow responsible for infecting the milk supply has been missed by clinical means.

Table VI.

County.	Number of Tuberculous Udders Detected on First Visit.	Group or Control Samples Positive.
Cheshire (1935)	152	84
Yorks. (W.R.) (1935-6) ...	27	9
Somerset (1936)	14	7
Oxford (1936-7)	5	2
Midlothian (1935)	1	3
West Sussex (1935-6) ...	9	5
Total	208	110 (34·6 per cent.)

The figures in Table 6 show that when investigating tuberculous milk supplies under Section IV of the Milk and Dairies (Consolidation) Act, on an average no less than 34·6 per cent. of tuberculous udders remained undetected by clinical means although the clinician had the great advantage of knowing there was a tuberculous udder to be detected. It is only natural, therefore, that without this knowledge a slightly higher proportion of infected udders will be missed clinically on routine inspection.

When herd sampling is adopted generally as a control over clinical inspection a more exact knowledge of the incidence of tuberculosis and the efficiency of inspection will be available.

The *total* incidence of udder tuberculosis as indicated by herd sampling combined with

routine inspection may then be used as a basis for comparing the number of tuberculous udders detected by clinical methods and herd sampling respectively, and the ratio of chronic cough cases to the *total* number of tuberculous udders.

Such figures are only available for Nottinghamshire where herd sampling is practised as a routine procedure following the clinical examination of the herds. The figures for Nottingham show that only 37·6 per cent. of tuberculous udders escaped detection clinically on routine inspection under the Milk and Dairies and Milk (Special Designations) Orders. This is most satisfactory when compared with the average of 34·6 per cent. for the Section IV results in Table 6 where there was, of course, the advantage of the knowledge of the presence of a tuberculous udder. Again, the chronic cough/*total* tuberculous udder ratio for routine inspection in the same county is excellent, namely 327/121 (approximately 11/4)—any ratio exceeding 2/1 may be considered as indicative of careful inspection.

SUMMARY

An attempt has been made to compare the results of routine inspection for the detection of tuberculosis in various counties on a common basis. It must be admitted that there is no method of comparison that is absolutely satisfactory on account of variations in local conditions, such as—the number of cows per farm, accessibility of farms, variations in husbandry, frequency of inspections and the period of years over which they have been carried out. A further variation which cannot adequately be allowed for, is the amount of the other duties of the veterinary officers in different counties.

It may be seen that considerable variations occur in the methods of administration and the results obtained in different counties. The factors which appear to influence the results are discussed, as also are the limitations of the routine clinical examination of cattle for the detection of tuberculosis.

Emphasis is laid on the necessity of controlling the clinical examination by herd sampling.

More exact methods of comparison will be possible only when a more uniform system of administration, examination and reporting is adopted.

Conclusions

(1) The success of the routine examination of dairy cows is influenced to a marked degree by the number of cattle that have to be examined. Poor results follow the examination of large numbers.

(2) The more samples that are examined microscopically the greater is the number of tuberculous cows detected.

(3) The best results occur where the microscopic examination of samples is performed by the veterinary officers concerned with the clinical examinations.

(4) A high percentage of positive results is obtained by the examination of samples of expectorate.

(5) The clinical examination of dairy cattle should be controlled in all cases by herd sampling.

(6) A standard system of reporting under the Diseases of Animals and Milk and Dairies Acts and Orders should be adopted.

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The Pathology of Histomonas Entero-Hepatitis in Turkeys and other Birds

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Entero-hepatitis, more commonly known as "blackhead" or "liver-rot," is a widespread and dangerous disease of turkeys which has been reported wherever turkeys are reared in numbers; but it occurs, though much less often, in chickens and other birds. The name "blackhead" is a gross misnomer, because darkening of the fleshy parts of the heads of turkeys is not a common feature of this ailment; indeed, in some instances, the head may look abnormally pale, so that "whitehead" occurs.

As a popular name "liver-rot" is much to be preferred, because it describes a lesion which is essential for the development of the disease.

Lately, some progress has been made in the knowledge of the causation and treatment of this important protozoal morbid condition, so that a discussion of its pathology can be profitably undertaken.

Birds Susceptible

Though entero-hepatitis is mostly seen in turkeys, it has been recorded in other birds—domesticated, semi-domesticated and wild. In my own experience it occurred in pea-fowls and partridges; and I have observed it in single instances since September, 1934, among my own chickens in fold pens and in these ascertained the histological features of the lesions and the presence of rounded forms of protozoal parasites. It has been mentioned this year as occurring in the Essex Laying Trials and in the columns of *The Field* I have noticed reports as to its occurrence in quail and pheasants.

Incidence in Great Britain

In my routine examinations, over a period of five years, I find that entero-hepatitis accounts for the death of nine out of ten turkeys sent for examination and diagnosis. The losses from this disease must be severe, because I have observed several farms in my neighbourhood where more than half of flocks of 50 to 60 turkeys have been lost through this cause. Nevertheless, in Essex I have visited a farm where, for years, about 40 to 50 turkeys had been successfully reared on a stubble field, with a low mortality, which the farmer credibly estimated at less than a dozen each season, all told. Personally, I have kept under observation small batches of turkeys, 12 to 15, during three successive seasons and my losses through entero-hepatitis have been one, five and two respectively. These are inadequate figures, but it must be admitted that the losses due to entero-hepatitis, suffered by turkey breeders in this country, must be serious, otherwise this branch of poultry husbandry would be more extensively practised, since the commercial returns are favourable and tempting.

In the U.S.A., Barger and Card (1935) state that entero-hepatitis has constituted the principal obstacle to successful turkey raising.

Causation

Theobald Smith (1895) described in the liver lesions of turkey entero-hepatitis, a protozoon which he named *Amoeba meleagridis*; this author reported in 1915 the presence of the same parasite in the liver lesions of fowls, and Tyzzer (1919) discovered it in the diseased liver of a two-year-old hen. In the meanwhile several papers had appeared confirming the presence of these bodies in the lesions of entero-hepatitis of turkeys, but diagnosing them as coccidia, artefacts, necrotic cells, yeast-like microbes, and so forth. Tyzzer (1920), however, continued his studies of the protozoon, recognised its motility in hanging drops (not longer than 72 hours) and its morphology in surviving preparations and concluded that it should be named *Histomonas* (gen. nov.) *meleagridis* (Smith) Tyzzer, 1920—this because the parasite was not really an amoeba, but belonged morphologically to a new genus. Then Tyzzer (1924) succeeded in experimentally infecting young chickens with *H. meleagridis*, but only obtained slight lesions, for the birds appeared to be usually resistant to the inroads of the parasite, though they might remain carriers of the protozoon in their bowels, and consequently droppings, over prolonged periods. The first to cultivate the protozoon on artificial media from the bowels of experimentally-infected chickens was Drbohlav (1924); Tyzzer (1934) was able to confirm the artificial cultivation of *H. meleagridis* also from the bowel contents of infected chickens. These cultivations from the caecal contents of experimentally-infected chickens were open to the criticism that the microbes obtained from the bowel contents, which natur-

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ally contained numerous harmless parasites, were in no way connected with the rounded forms seen in the tissue lesions, which possibly were not living.

Lately, Dr. Ann Bishop succeeded in isolating *H. meleagridis* from the lesions in the liver of a Rhode Island Red pullet from Shropshire. A medium slope, consisting of inspissated whole egg, was covered with inactivated horse serum diluted with Ringer's solution; to each tube a loopful of sterile starch was added. The flagellate protozoon obtained within 24 hours [together with a bacterium] corresponds morphologically to that described and illustrated by Tyzzer in his various papers and accordingly exhibits both a flagellate and amoebic type in cultures. At the time of writing [June, 1937] the strain is being regularly transferred and after more than five months of life *in vitro* at 37° C. the Histomonas are multiplying vigorously, together with the bacteria. The bacteria accompanying the protozoa may be contaminants introduced from the liver tissues or, more probably, bacteria present in the lesion and which have proved compatible and have helped the isolation of the parasitic Histomonas; for there were several negative results before success was achieved. [Bayon and Bishop. (1937.) *Nature*, Vol. 139, p. 370.] Further experimental work is being continued.

A brief reference may here be added regarding personal experimental inoculations. On two occasions I have succeeded in transferring entero-hepatitis to young chickens, six to eight weeks of age, kept on wire netting at the Molteno Institute, by mincing the liver of freshly-deceased turkeys and injecting it intraperitoneally in small quantities, not more than 0·5 c.c. A chick with such lesions was demonstrated on the occasion of a visit by the members of the International Microbiological Congress, 1936. The majority of instances, of three dozen inoculated, only presented minor, atypical alterations of the liver, which under the microscope were obviously scarred healed lesions.

Exterior Features of Entero-hepatitis

As in many other poultry ailments, an acute and chronic type can be distinguished, the acute form occurring more frequently in young turkeys or poults and the chronic form in the older ones; naturally there are exceptions, for rapidly-growing turkeys may go down with the disease just before Christmas.

The disease is, however, more common when the young poults "shoot the red," that is, when the carunculae or fleshy appendages of the head swell and develop—at approximately three to four months of age. The existence of both chronic and acute entero-hepatitis is indicated by an apparent lack of condition, consisting in ruffled feathers and disinclination to feed; in ranging the ailing birds will lag behind; the birds will not gain weight, or appear to be losing weight. No reliance can be placed on the appearance of the fleshy parts of the head, for turkeys easily change colour under the influence of different emotions. Admittedly, the symptoms described are those of heavy worm infestation or chronic coccidiosis, both of which occur in turkeys. There is, however, one sign of disease on which a reliable diagnosis can be based; that is the appearance of bright yellow droppings, the colour of flowers of sulphur. The fluff round the vent is also stained in the same manner. This colour is due to the disturbance of the bile secretion and general functions of liver and kidney. The dropped wings, leg-weakness or even total paralysis are terminal symptoms, which appear shortly before death.

In the chronic condition, emaciation, listlessness, rough feathering, fitful appetite, etc., will continue for weeks and eventually the bird be found dead in the morning; during the illness the droppings will continue to be streaked with yellow urates at intervals, but more usually are a deep green, instead of brown. It should be remembered that at times yellow streaks may appear in the droppings, without entero-hepatitis being present, as the result of some passing ailment; but then they will occur only for a couple of days.

Anatomical Lesions

The difference between the anatomical lesions of acute and chronic entero-hepatitis is mainly one of degree or intensity. In any case, the principal alterations are found in the caecal pouches and the liver; it is true that, rarely, definite lesions are found in the liver and no corresponding gross changes are detectable in the walls of the caecal pouches. These exceptional instances can be explained by the development of a small lesion or ulceration in the mucosa of the caecal pouches, through which the Histomonas entered the tissues and then penetrated the liver, where presumably the parasites multiplied and set up focal necrosis, whilst in the meanwhile the primary lesion healed.

The liver is enlarged, swollen, dark, congested and its surface will show numerous smooth, irregularly-rounded patches, consisting of different coloured concentric, intersecting rings, varying in tinge between a dirty green to a muddy yellow. A section of the liver will show that these patches extend right through the substance of the organ. The gall bladder is usually overfilled with slimy bile.

Attempted bacteriological cultivation from the lesions on ordinary media may prove sterile or yield bacteria which do not appear to have any definite or decisive pathological significance.

Liver of Turkey with Entero-hepatitis.

The abdominal cavity is usually moist or may contain a small quantity of clear transudation fluid. One or even both caecal pouches may be found adherent to the liver surface as the result of inflammatory processes originating in the bowel walls. In any case lesions of one or both caecal pouches will be noticeable, consisting of dirty white thickenings, usually oval and approximately the size of a small broad bean. These are more usually single. On incision faecal concretions may be found obstructing the lumen of the caecal pouch and the thickened spot found to be due to inflammatory reaction surrounding an irregularly punched-out ulceration; the heaped-up walls are a white, dingy white or dirty yellow; the inner surface pale, necrotic and does not bleed, like the ulcerations seen in coccidiosis. In my experience Heterakis larvae, eggs or worms are not found in the majority of instances.

The other organs do not usualy present any noteworthy or typical alterations. The spleen is at times somewhat enlarged and congested; the kidneys are more often swollen and pale, the ureters being clogged with white urates. These may be changes induced by the condition of the liver and bowels. The marrow is often pale.

In sections under the microscope, the lesions of the caeca are found to consist mainly of a massive, round-celled reaction around a necrotic fringe; there are but few capillaries, so that a natural healing process is not evident. Rounded forms of Histomonas can be detected in clusters.

In the liver, under low powers, the lesions present a certain resemblance to those of avian tuberculosis, consisting as they do of a centrally situated necrotic patch surrounded by inflammatory tissues; in entero-hepatitis the necrosis is less and the round-celled, histiocytic reaction is more evident than in avian tuberculosis of the liver. Giant cells may occur in both conditions, but the proliferation of bile ducts is certainly much more in evidence in entero-hepatitis, since it is part of an attempt of the tissues to form a scar and thus lead to healing. The decisive feature is, of course, the presence of rounded forms of Histomonas (which I avoid calling encysted so as not to offend the protozoological purists; for true cysts have not been found in Histomonas) in clusters in the tissues; the rounded forms are hyaline and careful focussing should detect a nuclear structure. In some instances a process of scar formation is evident from the presence of proliferating connective tissue, which appears to shut off the diseased portions by a wall of fibrous network. Young capillaries or haemorrhagic spots are rarely in evidence.

Entero-hepatitis and Blastomycetes

Among the more recent contributions to the problems connected with the causation of entero-hepatitis, are the investigations of Enigk (1935) who has isolated a blastomycete from the tissues and bowel contents of turkeys; he performed numerous experiments with these cultures, and claims thus to have successfully reproduced the disease both in turkeys and chickens; he also transmitted the condition by feeding a turkey with diseased liver. It is difficult to criticise these carefully-recorded experiments without having had the culture and repeated the inoculations; but in reading the notes it is remarkable how often it is reported that lesions of the air-sacs and kidneys, etc., have developed—alterations which do not occur in entero-hepatitis and which, when they are met with in this condition, can only be considered as secondary complications.

It is, however, possible to make some observations on the criticisms of Enigk (1935) relative to previous investigations and to the aetiological significance of *Histomonas meleagridis*. Perhaps the objections can be summarised as follows:—

(1) Histomonas has never been isolated in artificial culture from the lesions of entero-hepatitis. Reply: It has now.

(2) There is no agreement about the morphology of this microbe; in particular, the change from a flagellate to an amoebic form is difficult to understand. Reply: In the cultures in our hands the change in morphology is quite evident, though admittedly remarkable. Free-living protozoa are known which present similar transitional forms.

(3) The so-called nuclei seen in the forms in the tissues are in reality vacuoles. Reply: In my sections the rounded forms show a definite nuclear structure and in artificial cultures nuclear division can at times be detected in the Histomonas.

Heterakis Worms and Entero-hepatitis

That Heterakis worms might play a part in the causation of entero-hepatitis was first suggested by Graybill and Smith (1920), who produced entero-hepatitis in turkey poults by feeding embryonated Heterakis ova. Subsequent investigations suggested that the action of the helminth might be two-fold; first by transmitting the Histomonas enclosed in the worm eggs and then as the result of the observed habit of the Heterakis larvae, which burrow into the mucosa of the caecal walls and thus cause a lesion which permits the entry of the Histomonas in the tissues. In my opinion, experimental work to prove these views has not been quite conclusive; in any case not in the sense that the presence of Heterakis worms is necessary to explain the carrying over of the infection from one season to another on some particular patch of ground. Nor does it seem that the larvae are really necessary to explain the penetration of the Histomonas through the caecal walls to the liver, because I have encountered entero-hepatitis in chickens on wire netting, where no Heterakis worms were present. It seems as if Histomonas can penetrate and invade the tissues through any lesions, not only those caused by Heterakis larvae, and that in this country at least, Heterakis and their larvae are not frequently present in the caecal pouches of poults or adult turkeys suffering from entero-hepatitis.

The living carriers of Histomonas—turkeys, chickens and other birds—are more probably the explanation of the incidence of entero-hepatitis season after season in certain flocks.

Diagnosis

This is easy in typical instances; that is, the great majority: I do not think that there is any disease that can simulate entero-hepatitis in turkeys, without being caused by Histomonas. My reason for this opinion is that the lesions of caeca and liver are nearly identical in all turkeys affected. In chickens and other birds, it must be admitted that at times difficulties do arise, for in these there is a greater degree of natural resistance to the disease and correspondingly a more easily recognisable tendency towards natural healing; so that sharply-defined, compact lesions can be seen, similar to those produced by injected minced entero-hepatitis liver. Such scarry lesions are dry, white or light yellow nodules and may simulate those occurring in avian tuberculosis; a simple bacteriological examination for acid-fast bacteria should decide.

In turkeys, any veterinarian who has examined a few typical instances of entero-hepatitis will recognise the liver alterations with a minimal margin of possible error.

Prevention

Nutrition and management appear to play an important part in relation to prevention, a matter of the greatest practical importance. According to text-books, prevention can be successfully put into practice by avoiding infestation with the worm *Heterakis gallinae*—a relatively easy thing to do, for it can be achieved by rearing the turkeys on wire netting or by reconditioning the soil; that is, digging it up, turning over, raking, scattering agricultural salt and raking again; after this avoiding the presence of birds that are infested with the worms. However, experience on farms has shown that this is not enough, because the worm is not a necessary accompaniment of the disease.

On the other hand, if it is right to consider the protozoon Histomonas the principal cause of entero-hepatitis, then this is so easily killed by drying, that the rearing of turkeys on dry, sandy soil with a free range can be strongly recommended; advice which will have the support of turkey breeders.

When considering the nutrition of turkeys, the large vitamin A requirements of the rapidly-growing turkey must be remembered. The effects of vitamin A deficiency differ slightly from those observable in chickens. In turkeys the appearances of avitaminosis A have been carefully studied by Hinshaw and Lloyd (1934) and found to be characterised by a condition well known to turkey breeders as "swell-head"; in pathological terms, an inflammation of the sinuses below the eyes, resulting in their filling with a slimy, sticky fluid; in addition, there are the usual lesions in the upper digestive and respiratory tracts. Similar lesions have also been described by Turner and Loew (1933). The vitamin A requirements of the growing turkey have been ascertained and measured and found to be double those of the chicken (Simonnet, 1936), which are already considerable—approximately 400 international units per day (Ackert and Nolf, 1931).

The requirements of turkeys are best supplied by mixing at least 8 per cent. of good green meal to the mash or by giving an abundant maize feed; the latter, however, should be

suitably balanced by the addition of bran, so as not unduly to increase the starch present in the mash. For this reason, it is necessary to allow the turkeys an extensive dry range on which they can exercise and pick up grit and other essentials to complete their dietary.

The prevention of entero-hepatitis in domesticated birds other than turkeys is a matter also requiring some attention, for whilst the disease is not a cause of serious losses, yet it is not amenable to individual treatment, as is the case with large and valuable birds, like turkeys. Moreover, when entero-hepatitis occurs in chickens or other birds, such as pheasants or partridges, I have usually found it to be connected with muddy or fouled runs or feeding grounds, combined with other errors in management.

Surgical Preventive Treatment.—There is one further preventive measure that should be mentioned, *viz.*, surgically removing the caecal pouches, acting on the presumption that the Heterakis worms, which naturally congregate in the lower end of the pouches, will find no place to shelter in and that consequently the Histomonas will not be given a chance to invade the liver. The operation is not without danger, even in skilled hands, and the after-effects are apt to be disappointing; for of the poults so treated, half the numbers die shortly after the operation and the survivors do not thrive sufficiently to justify the trouble taken. This surgical intervention has, however, been improved and simplified, first by Durant (1926) and then practised by Schlotthauer, Essex and Mann (1923) and Delaplane and Homer Stuart (1933), ligation being substituted for excision and ablation. They operated through an abdominal incision, drawing up the caeca through the opening, completely crushing the cross-section of the bowels with a suitable pressure clamp, and then tightly tying the tissues above and below the clamped portion; the clamp was removed, the bowels replaced and the incision sewn up. After some weeks the caeca were found to shrivel up without trouble. The authors consider that the operation is best performed at four weeks of age and protects poults against entero-hepatitis during four months. Mortality was reduced to 14 per cent.

Individual Therapeutics

The treatment of this ailment naturally has attracted a great deal of attention. Some turkey farmers state that they have an infallible cure for "blackhead" and this may be found to be that popular panacea, Epsom salts or a teaspoonful of neat whisky poured down the throat of the unfortunate bird; others believe in catechu in the drinking water; but I have noted that none of these methods stands the test of time and varying conditions. For whether these treatments are effective or not, anyone who has seen the lesions in the bowels and liver must admit that the dead and rotten tissues cannot come to life again.

On the other hand, any form of treatment which can act specifically on the Histomonas causing the disease, should stop early cases and prevent the development of further causative microbes. Accordingly the intravenous injection of suitable arsenical preparations can prove of real curative use, if promtly applied in the early stages. As a control I have been able to examine the scarred lesions in the caeca and liver of turkeys killed when in apparent perfect health, having recovered after an attack on being treated by means of an arsenical preparation (Hepastab). It has been ascertained that the arsenic is eliminated within three weeks, so that the birds should not be killed for food until that time has elapsed. From personal experience I cannot recommend the injection of arsenicals for the purpose of prevention, which requires instead that full attention be paid to rational feeding, with consequent reconditioning of the runs and the practice of those general measures of preventive sanitation, which have proved successful in avoiding the spread of disease in relation to other branches of poultry husbandry.

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THIRTEENTH INTERNATIONAL VETERINARY CONGRESS

Reporters Nominated by the British National Committee

The Permanent Committee of the International Veterinary Congresses has accepted the following nominations by the British National Committee of reporters for the Thirteenth Congress to be held at Zürich-Interlaken in 1938:—

(*B*) Sectional Meetings:—

I.—Medicine and Surgery

Recent progress in haematology of animal diseases.—Captain J. R. Barker, M.R.C.V.S., D.V.H., St. Peter Square, Hereford, England.

The present status of anaesthesia.—Professor J. G. Wright, F.R.C.V.S., Royal Veterinary College, Camden Town, London, N.W.1, England.

II.—Infectious Diseases

The value of tuberculin testing in the control of tuberculosis.—R. E. Glover, Esq., B.Sc., F.R.C.V.S., Institute of Animal Pathology, Milton Road, Cambridge, England.

IV.—Parasitology and Parasitic Diseases

Pasture hygiene in relation to parasitic diseases of man and animals.—E. L. Taylor, Esq., B.V.Sc., M.R.C.V.S., D.V.H., Ministry of Agriculture Veterinary Laboratory, New Haw, Weybridge, Surrey, England.

V.—Tropical Diseases

Recent research on diseases of tropical and sub-tropical countries.—R. Daubney, Esq., M.Sc., M.R.C.V.S., Chief Veterinary Research Officer, Kabete, Nairobi, Kenya Colony, East Africa.

VI.—Fowl Diseases

Lymphomatosis. — Professor T. Dalling, M.R.C.V.S., Institute of Animal Pathology, Milton Road, Cambridge, England.

VIII.—Meat Inspection and Hygiene of Milk

Milk hygiene.—Major Brennan DeVine, M.C., F.R.C.V.S., D.V.S.M., Chief Veterinary Officer, City Veterinary Department, 7, St. Martin's Lane, Birmingham, 5, England.

IX.—Army Veterinary Medicine

Prevention of animal diseases under war-time conditions.—Jointly by Colonel A. G. Todd, C.B.E., D.S.O., M.R.C.V.S., "Amulree," Fleet, Hants, and Major A. A. Pryer, D.S.O., M.R.C.V.S.

The Veterinary Record

August 14th, 1937.

The Parliamentary Debate on the Agriculture Bill

THE passage of the Agriculture Bill through Parliament was so rapid and the Association's annual congress followed so quickly that we have been compelled to refrain from comment until now upon the Parliamentary debate. Nevertheless, disappointing to the profession as this debate was in some respects, in many others it can be looked upon with considerable satisfaction.

Ignoring for the moment the very considerable omissions from the Bill of all attempt to unify, centralise and raise to an adequate level of efficiency throughout the country both the service for the inspection of meat and that for the control of the production and distribution of milk, we may justifiably feel pleased that a Bill which attempts to face squarely problems associated with diseases of cattle received such unanimous support from both Houses of Parliament. What we most regret is that none of the amendments referring to professional matters was adopted. Nevertheless, we can look back upon the debates with the knowledge that never before has the veterinary profession been so much before the public. Three hours of debate in the House of Commons cannot have been without its educational value both upon our legislators and the general public. Indeed we can feel some satisfaction that the debate was sustained upon such a high level and that this journal was quoted during its course. At the same time the letter published in *The Times* and signed by the President and Chairman of the Parliamentary Science Committee must have had a similarly educative value. These facts, together with visits of representatives of the Association, not only to many individual members of both Houses of Parliament, but also to the Conservative Agricultural Committee, and to the Minister of Agriculture himself, indicate that the Association was not idle during the short time of the passage of this Bill and that much good to the profession may be expected from the vigour and thoroughness of all these efforts.

We cannot understand why the Government should refuse to sanction the introduction of a simple amendment, made retrospective to previous Acts, which would have overcome quite simply the objections to the use of the term "inspector." As things are we must follow the implied advice given by the Minister to the delegation from the N.V.M.A., when he stated that the word "inspector" was merely a statutory definition, and that he felt that "in practice the term veterinary officer would become more generally used." We hope the Ministry itself will follow the advice of its head upon this point.

The debate upon the status of the Chief Veterinary Officer has probably done much good in spite of the fact that its main objective was not gained. After prolonged debate the Minister of Agriculture stated on the floor of the House that "the position of the veterinary profession will be enhanced by these proposals, and the administrative arrangements will safeguard the position to the full," and later he promised that "the Chief Veterinary Officer will be the only person who will advise the Minister on veterinary matters." These statements will go some way to lessen the anxiety of the profession upon this point, but the Association still looks forward confidently to the time when the Chief Veterinary Officer will be given his proper place within the organisation of the Ministry of Agriculture and Fisheries, a place similar to that held by the chief veterinarian of such other countries as the United States of America, France, Germany, Switzerland, Holland, and indeed many others.

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A Lesson from Ireland

WE feel we cannot allow to pass unnoticed in a leading article the gathering of veterinarians during last Spring Show Week, in Dublin, the report of whose proceedings was published in the last issue of this journal. The record clearly shows it to have been in every way a model of what a well-planned professional gathering should be, met as it was to learn what was suggestive from the recent advances of science, practicable from the trials of enthusiastic teachers, and fruitful and beneficial from the experience of observant and enterprising practitioners. The introductory paper read by the President, Professor T. G. Browne, revealed a mastery over the whole varied and expanding field of relevant scientific advances and a capacity for thoroughly digesting the rich and rapid growth of knowledge available that make one look forward hopefully to more of these readily assimilable

and trustworthy contributions from him. The discussion which followed would surely have gladdened the great heart of the founder of this journal, and it cannot but make one feel how well served the agricultural public of Ireland must be by its highly competent veterinary practitioners. It is noteworthy as evidence, if indeed further evidence need be sought, that science knows no national boundaries and that some of the most remarkable weapons of attack upon disease now placed in the practitioner's armamentarium are forthcoming from the researches of German chemists. Almost unique and of the greatest possible value to the practitioner must have been the well-ordered series of demonstrations arranged at the meeting. In particular, as a valuable contribution to farming practice, we would call attention to Professor Browne's method of nerve-blocking for dishorning cattle; and, the resolution passed unanimously at the meeting that the success of the method should be brought to the notice of the Free State Government, so as to legalise the use of a local anaesthetic for this common and necessary operation. We cannot but look upon this success as a triumph of applied anatomy.

In perhaps a larger sense the meeting was an historic one and of the deepest significance at the present time to the veterinary profession generally. It was the first occasion when the two Irish associations, namely the V.M.A. of Ireland and the North of Ireland V.M.A., had come together, and we may well join with the President in expressing the hope that the meeting will be looked back upon as a forerunner of an unending series of similar reunions. We are now assured that with the wealth of experience gained by our colleagues in Ireland they have a contribution to make to the advancement of veterinary science that will not be restricted in its interest and utility to Ireland alone.

We must recall that after all the bitterness and turmoil that preceded the Treaty of 1919, which granted separate constitutional status to the greater part of Ireland, the veterinary profession in Ireland of their own free will sought to remain within the body corporate of the profession. In all the negotiations of the time between the Free State authorities and the R.C.V.S. we understand that their conduct was tempered with reasonableness and willingness to co-operate. We might have said, inadvisably perhaps, considering the circumstances of the time, that this reasonableness was shown to a surprising degree, were it not that in our profession we have had long contact with the Irishman in one of the interests he has most at heart, his genuine love of all animals, and hence have common ground for ready understanding, and have known him for a sportsman in the highest meaning of that word. Within the organised structure of the veterinary profession as it has now come about in the course of its evolution—the R.C.V.S. as a statutory authority and the N.V.M.A. as a free guild—the genius of the Irish veterinarian has found unfettered scope for its development, and North and South, as we now see, can live in harmony. Very remarkable has been the determination of the Free State Government to recognise the profession meritoriously by having no truck with charlatanry.

DEVON DAIRY HERDS: "WONDERFUL RESTORATION OF CONFIDENCE"

At a recent meeting of the Devon Public Health Committee, on a report on the veterinary inspection of dairy herds in the county, a member, Mr. Lake, said they had proof of the benefit of appointing three county veterinary officers, whose work had been of assistance to local veterinary officers, in the excellent health of Devon herds. There had been a wonderful restoration of confidence in regard to the consumption of milk. Milk bars were springing up all over the country in a manner undreamt of a little time ago.

Regarding inspection of premises, they were spending a tremendous lot of time visiting those producers who were doing their level best to produce good milk, and this had to be done under order, but they were allowing other farm conditions to go on without very much being done.

He suggested that local veterinarians be asked to supply samples of milk from farms not already visited. He thought the moral effect of such a procedure would be enormous. This could be done at a very moderate cost.

Dr. J. R. Harper thought they were getting excellent value for their money in every possible way. Roughly, over 80,000 cows had been inspected by the veterinary department and it was found that less than 1·5 per thousand were tuberculous. That was a very much smaller proportion than that for the rest of the country.

Mr. W. Maddicott said he listened the previous day to the Minister of Agriculture outlining his long-term milk policy and had the impression it was the Minister's determination that every herd in the country was to be examined before long.

Sir Francis Acland, M.P., thought the Minister's interim policy would mean that some part of the present system would be taken over. Would not that be the appropriate occasion to consider such suggestions as that made by Mr. Lake? They could reconsider the whole subject of veterinary work which was left to them.

Mr. Lake agreed that they must await the opportunity.

The report was adopted.

CLINICAL COMMUNICATION

Suspected Poisoning of Goats by Hemlock (Conium maculatum)

BERYL COPITHORNE, M.R.C.V.S.
Abbots Langley, Herts.

The goats are cross-bred, of Anglo-Nubian and Toggenburg strains, and are kept on an island formed between a canal and a curve in a river bed. The goats have not been off the island for nearly a year, but at one time they had freedom all day to graze along the hedges by the towing path. The island is almost an acre in size and is divided into two sections, one of which is partly garden and partly rough waste ground (a garden gone back to the wild) and is covered with weeds and coarse grasses, among which a plant identified as *Conium maculatum* has been found growing freely. The soil of the island is very fertile and all the plants grow profusely. The other section of the island, where the goats are kept, is shaded by oak and ash trees; the ground is bare and hard as the goats eat off all greenstuff as it grows, with the exception of cuckoo pint (*Arum maculatum*), which they do not appear to touch. The island is well drained and is not marshy. The animals drink from the canal or the river, as do poultry, cats and a dog. The goats are entirely hand fed on grass, weeds, nettles, etc., cut from the waste ground, and on hay gathered from the rough corners of a nearby nursery garden, and rarely have any grain or concentrated food. They are housed at night.

The herd consisted of eight goats—one male, one castrated male and six females (two in-kid). All these were healthy until the end of April this year. The billy-goat is always picketed (by a long chain and stake) on the waste ground and is free to graze and choose his own food. Though there is a large plant of *Conium maculatum* beside his shelter hut he will not eat it. The other goats, however, would willingly eat hemlock when offered and now seem to prefer it to other plants.

Case No. 1.

Subject.—Seven-year-old female.

Kidded about April 10th (kid destroyed).

Towards the end of April she had a few days' illness, which the owner called a "stomach attack." She recovered from this and appeared normal till May 6th. On that day she developed diarrhoea, which became more profuse, was greenish in colour and contained a little blood. She was very dull, had no appetite but great thirst. On May 8th she seemed to be responding to treatment and began to feed a little. On May 10th she was down, unable to stand, grunting, salivating and crying loudly at times. She had difficulty in urinating. She became steadily weaker and died the same evening. No *post-mortem* examination was made.

It is suggested that the goat received a further supply of the poisonous material on May 8th or 9th when she was beginning to improve.

Case No. 2.

Subject.—Two-year-old female.

The animal was normal up to May 19th. She had diarrhoea during the night and on the morning of the 20th she gave no milk and did not feed. About 9 a.m. she was found lying flat on the ground crying loudly and screaming at intervals. When seen at 11 a.m. her temperature was 99° F., the ears and legs were cold and the head was turned stiffly on the flank. When lifted, she could not stand. She was kicking wildly with her hind legs and at intervals she stiffened, when the limbs could not be moved. This stiffness having passed off, she lay trembling; then the kicking would begin again. She became weaker and died about 1 p.m.

Post-mortem.—The rumen was very full of grass and vegetable material. There was no trace of ingesta beyond the abomasum, which contained a little greenish fluid. The intestine was empty and much inflamed. No parasites were seen. The other organs appeared normal.

Case No. 3.

Subject.—Two-year-old female.

On June 20th this animal had slight diarrhoea and a little blood was passed. When seen about 10.30 a.m. she was bright, active, showed no sign of pain, and was feeding normally. Later in the morning she stopped feeding and cudding, seemed listless and lay down frequently. About midday she went into the shed and lay down. The owner thought she was sleeping, but about 9 p.m. discovered that the goat was very weak and could not get up. She did not seem to struggle. When seen, soon after 9 p.m., her ears and legs were very cold. The temperature was 100° F.; respiration was at first rapid and later sighing. She salivated constantly. The pulse was very irregular, about 40. The owner stated that she had been grinding her teeth and grunting during the evening. She died about 10 p.m.

Post-mortem.—The following report was received from the Research Institute of the Royal Veterinary College.

General Condition: Fair.

Thorax: Ten c.c. clear, straw-coloured fluid in the pericardial cavity. Wall of right ventricle pale and flaccid. Numerous sub-endothelial haemorrhages in both ventricles.

Lungs: Deep red to purple; blood flowed freely from the cut surface. Bronchioles contained blood-stained froth, which was also present in the trachea.

Abdomen: Rumen was distended with a large mass of vegetable material containing numerous hard stalks about 1·5 cm. in diameter, but it was not possible to identify with certainty whether this was *Conium maculatum*. There was a small quantity of similar material in the oesophagus.

The contents of the abomasum consisted entirely of greenish fluid with a little gritty material. There was no sign of congestion of intestinal or stomach wall.

There were no parasites.

Kidneys were soft and pulpy, probably a *post-mortem* change.

The remaining organs were normal.

Cause of Death: There was no evidence of contagious disease and no pathological lesion to account for death. The *post-mortem* findings were compatible with the diagnosis of hemlock poisoning, but as the plant could not be identified in the rumen, it is not possible to state with certainty that this was the cause of death.

Case No. 4.

Subject.—Three-year-old female.

Kidded on May 25th. On June 21st she was noticed to be off food, staggering, nearly falling when attempting to lie down, twitching her ears and shaking her head. She was listless and did not want to move. The faeces were normal. Her ears and legs felt cold; the temperature was 100° F. She was given 4 oz. of sodium sulphate in water. The owner reported that she had been very listless all day. During the afternoon she passed a quantity of greenish faeces. She gave no milk in the evening but seemed brighter. Next day the animal was steadier and brighter; she gave about a pint of milk in the evening and fed fairly well. On June 23rd she seemed normal and has continued so. She is now milking fairly well.

Case No. 5.

Subject.—Three-year-old female.

This goat was in fair condition and was milking well. She kidded on June 16th with difficulty (kid destroyed). On the morning of July 1st the goat refused food and gave no milk. The owner stated that "she looked wooden." She had passed a small quantity of diarrhoeic matter during the previous night. When taken out of the shed she staggered and had difficulty in walking, while she also had difficulty in urinating. She went into the dog kennel, lay down and screamed, and was, with great difficulty, brought out. The owner gave her about 3 oz. of sodium sulphate in water, but some of this dose was spilt. When seen about 1 p.m. she was down, grinding her teeth and grunting. Her temperature was 100·2° F., pulse rapid and weak and respiration rapid and shallow. There were traces of blood around the anus, also a little green froth. She began a furious kicking and paddling with hind and fore legs, her lip twitched and she appeared to be biting the earth. Earth and small grit were wedged between her teeth. Her eyes were widely dilated and rolling and the corneal reflex was sluggish. There was an interval of comparative quiet with stiffening of the limbs and neck muscles. As this relaxed there was marked trembling and then she passed into another convulsion. After several such attacks she became gradually weaker and died about 2 p.m.

A *post-mortem* examination was carried out at once.

Thorax: No abnormality was noticed. There was a little froth in the trachea.

Abdomen: The rumen was very full of vegetable matter, which seemed practically unchanged. Kibbled maize given the previous evening was still small and hard and amongst the vegetable material the following were identified: "horse-tail," chervil, hemlock, small horse chestnuts and elder leaves. There was no inflammation and no parasites were seen. The remaining organs were normal, including the uterus. There was no lesion to account for death.

The onset of *rigor mortis* was very rapid.

The cut green food supplied to the goats on the evening of June 30th contained small plants of chervil and hemlock. This food was cut from the towing path.

The owner is doubtful whether the goats would have had enough hemlock to cause poisoning and is inclined to blame chervil, as there is no doubt that the food was grossly contaminated by these plants.

Treatment.—In each case treatment was symptomatic—saline purgatives and stimulants.

The owner was advised to move the goats to fresh pasture, but as this did not prove possible they are now being fed on carefully hand-picked food and allowed more concentrated food.

No other change has been made.

There is no way of estimating the amount of hemlock eaten by the goats as the cut food supplied to them was probably grossly contaminated.

On the ground from which this food was cut were hemlock plants in all stages of development; most plants were about two feet in height and coming into flower in early June.

The owner has had similar trouble during other years, losing one or two goats each season, but had never connected the deaths with plant poisoning.

On the evening of July 9th the remaining goats seemed healthy. The fourth one has made an apparently complete recovery. The three other adults and the five-weeks-old kid are normal.

Acknowledgment.—I wish to thank Professor J. G. Wright, of the Royal Veterinary College, for his assistance.

REPORTS

Southern Rhodesia

REPORT OF THE CHIEF VETERINARY SURGEON FOR THE YEAR 1936

As recently as June last we recorded the death of that pioneer of veterinary science in South Africa, C. E. Gray, who, single-handed, founded the veterinary service in Southern Rhodesia during the invasion of that territory by rinderpest in 1896. No better tribute to Gray's memory could be found than this report, which clearly indicates how solidly those foundations were laid, and how ably the work has since been carried on by Sinclair and Hooper-Sharpe.

The year opened quietly, for there had been no foot-and-mouth disease in the country since the previous July, while African Coast fever had not been known in Matabeleland for the previous nine years. In March, however, foot-and-mouth disease occurred in the Victoria district and from there infection was conveyed to the Bulawayo export abattoir and to two native reserves and one ranch. The origin of infection in this, as in some of the previous outbreaks, has been just as obscure as the outbreaks in this country, but it is interesting to note that the "carrier" theory, by which the virus is believed to be harboured in a recovered animal, is now favoured. Although the disease has been eradicated in other districts where precisely the same combative measures have been applied, recrudescences have always occurred in the Victoria district, and the Chief Veterinary Officer states, "there must exist in this particular locality some reservoir of infection, the most likely of which is one or more recovered animals, or carriers." We cannot say that we are altogether convinced that the "carrier" theory is the correct explanation of these recurrences, but have to admit we have no better explanation to offer. It appears to us that research work on the viability of the virus under South African conditions is called for.

Following this outbreak the Union Government took a more lenient view of the situation than formerly, and instead of prohibiting animal and vegetable products from the whole of Rhodesia, confined such measures to an area around the infected districts, a concession which we know would be fully appreciated by the Rhodesians.

African Coast fever has again appeared at several new centres and a new form of Theileriasis called "specific disease" has been found in the Melsetter district. This disease is not quite typical of African Coast fever but so closely allied to it that it is recommended that it be treated as such. The position regarding African Coast fever is not considered satisfactory and again attention is drawn to the necessity of carrying out intensive cattle dipping and for cattle owners to submit smears for examination of all animals that die.

From the report we gather that Rhodesia has less anthrax than the neighbouring territories, and that heartwater, owing to the continued spread of the vector (*Ambylomma hebraeum*), is on the increase.

There have been the average number of cases of quarter evil, anaplasmosis, tuberculosis, trypanosomiasis, and that pest to the rancher known as "screw worm" (cutaneous myiasis).

Excepting at Liebig's factory at West Nicholson, which showed an increase in animals slaughtered from 26,462 to 45,739 head, the general export of animals on the hoof, chilled and frozen beef and animal products shows a decrease owing to the foot-and-mouth outbreak, but as indicated, normal export was resumed before the year closed.

One concludes the report with a feeling that our colleagues in Southern Rhodesia have come through a strenuous year with considerable credit.

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Bengal

[Reports of the Civil Veterinary Department and of the Veterinary College for the Year 1935-36. (High Commissioner for India, India House, Aldwych, W.C.2. Price 6d.)]

I.—Civil Veterinary Department (P. J. Kerr).—The staff consisted of a Director and Veterinary Adviser, two Assistant Directors, nine Veterinary Inspectors and 130 Veterinary Assistant Surgeons. A Veterinary Investigation Officer (M. B. Menon) was employed for special work.

The activities of the staff on tour appear to be unduly limited for lack of funds for travelling expenses. In the year under report there was a widespread outbreak of rinderpest. Preventive inoculation with goat tissue vaccine was carried out on a large scale; 1,406 outbreaks were dealt with and 400,000 animals inoculated. The death-rate among the protected animals was 1·8 per cent. It is stated that preparations for such an emergency had fortunately been made previously and it is clear that this is very creditable to those concerned.

The work at the hospitals and dispensaries and also that of the itinerating staff showed a satisfactory increase.

II.—Bengal Veterinary College (A. D. MacGregor).—The staff consisted of the Principal, eight Lecturers (including the Vice-Principal) and 14 Assistants. The College continues to be popular and there is an increase in the number of candidates from Bengal. Many

ABSTRACTS

[**Infectious Pleuropneumonia of Goats in Palestine: Communicability to Sheep.** Gilbert, S. J. (1937.) *J. Comp. Path. & Therap.* **50.** I. 33-38. (1 table, 2 figs.)]

In the hilly northern parts of Palestine there have been heavy losses of goats from pleuropneumonia during severe winters. During the winter of 1936-37, which was severe, the heaviest losses were in the centre and south of the country. A considerable number of sheep also died in the same area exhibiting similar symptoms. Affected animals showed a viscid nasal discharge, loss of appetite, cough and emaciation. *Post-mortem* lesions of pneumonia and pleurisy were not constant (only 20 per cent. during this last winter). Details of transmission experiments are given showing that the incubation period is less than 48 hours and that the disease is caused by a filterable virus communicable to sheep. The disease is not likely to be fatal, except when animals are in a low condition and exposed to very cold weather.

J. S. P.

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[**Septicaemia of Lambs Caused by the Bacillus of Swine Erysipelas.** (Trans. title.) Cordier, G., and Ménager, J. (1937.) *Rec. Méd. vét.* **113.** 4. 215-221.]

A brief account is given of a septicaemia in lambs occurring in Tunis. *Post-mortem* examination revealed a slight intestinal congestion. Culture of the heart blood and bone marrow on the usual media showed the presence of an organism closely resembling the bacillus of swine erysipelas. Cultures proved lethal for pigeons. The aetiology of the condition is obscure; it is suggested that infection may have occurred through the umbilicus.

E. C. H.

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[**Infectious Keratitis of Ruminants.** Hagens, H. J. (1936.) *N. Amer. Vet.* **17.** 12. 24-26.]

This disease appears to be increasing in frequency in range animals and causes very serious economic losses due to retarded development, and lowered production.

The author maintains that, whilst the condition is primarily secondary to some infectious disease such as pasteurellosis, his observations of many herds have led him to the conclusion that infectious keratitis may become an aetiological entity and that once the infection has attained a certain virulence it is communicable both to animals of the same species and to other ruminants. In numerous cases in sheep and goats diplococci were demonstrated in smears. Horses and mules did not become infected although in contact with diseased animals.

The disease commences with a more or less severe conjunctivitis accompanied by a mucopurulent discharge. Corneal opacity is common and this may affect the whole surface of the eyeball or several circumscribed and isolated areas may be present. Abscesses and ulceration of the cornea follow. Even in advanced cases the prognosis is not unfavourable provided the complications due to self-mutilation have not occurred.

Some animals recover spontaneously, but when the disease has become established the damage is more extensive and repair more prolonged and difficult. Permanent blemishes may remain.

Treatment should be directed against the primary condition if it can be established, using suitable vaccines or antisera and adding to them suitable doses based upon the organisms associated with the keratitis. If the primary cause is not known the mixed keratitis vaccines should be used alone. Advanced cases should be isolated.

Additional treatment is also recommended. The author has had good results by blowing equal parts of calomel and lactic acid daily upon the eyeball. In suppurative forms irrigation with 1:2,000 solutions of bichloride of mercury is made.

G. D.

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[**Pathologic and Physiologic Studies on Dogs receiving Fluorine in Doses Comparable to those Encountered in some Water Supplies.** Biester, H. E., Greenwood, D. A., and Nelson, V. E. (1936.) *N. Amer. Vet.* **17.** 10. 38-43.]

A series of dogs was fed with doses of sodium fluoride (0·45 to 4·52 mg. per kilo. body weight) for periods of seven to 15 months. The enamel of the teeth became deeply pitted and mottled; a similar condition occurs in man after the consumption of drinking water containing fluorine. Histologic changes consisted of a slight inflammation of the small intestine with giant cell formation in the mesenteric glands. The spinal cords of those animals receiving the higher concentrations of fluorine showed advanced degeneration of the myelin sheaths and fatty degeneration of the epithelium of the convoluted tubules of the kidney. Analysis of the blood revealed no significant changes; also no change occurred in the structure and measurement of the bones.

E. C. H.

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students come from other parts of India and some from abroad. The results of the annual examinations were satisfactory. The Raymond Research Laboratory and the Department of Epizootic Diseases of Animals in Calcutta, which are under the control of the Principal, record a year of useful and effective work.

G. K. W.

REVIEWS

[**"How Animals Behave."** H. G. Wells, Julian Huxley and G. P. Wells. Cassells' "Science of Life" Series: Vol. 7. Price 4s.]

A most pleasant and instructive little volume entitled "How Animals Behave" has just come to hand. It is the seventh volume in the "Science of Life" series, and is written by no less illustrious authors than H. G. Wells, Julian Huxley and G. P. Wells.

The series aims at presenting for the lay reader a complete survey of the main results of biological science and, as the authors say, ". . . from each of the different branches he can gather something of consequence." If the booklet under review is a typical specimen of the other members of the series, then we are left in no possible doubt as to the veracity of the above assertion.

The work is divided into three chapters—all packed with interest and instruction—under the following heads: (1) The Rudiments of Behaviour; (2) How Insects and Other Invertebrata Behave, and (3) The Evolution of Behaviour in Vertebrates.

Some of the information in chapter II and, in particular, the section dealing with the "Ways of Life among Ants," seems so grotesque and wonderful as to be almost incredible; whilst authentic information upon the "Behaviour of Monkeys and Apes" never fails to arouse in the average reader the greatest interest and amusement.

We could continue to instance numerous other sections crowded with equally absorbing and curious facts, but think it will suffice if we heartily commend the book to our readers for perusal.

Fortunately, for those who would enrich the leisure hours this holiday season, the volume is of convenient pocket size. It is printed in clear, legible type; is illustrated and well bound.

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[**Supplementary Catalogue of British Medical Films of Technical Interest to Medical Practitioners and Students.** January, 1936 to January, 1937. (The British Film Institute, 4, Great Russell Street, London, W.C.1.)]

The value of the cinema as an aid to the teaching of medical and veterinary science is already accepted. The film record, whilst not in any way replacing the practical side of student work, serves as a useful adjunct in the preliminary approach to actual practice by means of illustration, in a way which can easily be remembered. The British Film Institute have recently issued a supplement to their catalogue of medical films, and whilst the majority of the films are of medical interest, several of those dealing with biology and physiology should prove useful in the teaching of pre-clinical subjects. Thirteen films, mostly dealing with surgical subjects, are included in the veterinary section. We must point out, however, that it is now some considerable time since these films were produced at the Royal Veterinary College, London, and that they deal with only a very small field of veterinary work as a whole. It is to be hoped that in the near future arrangements will be made for the production of additional films illustrating other aspects of the practice of veterinary medicine and science.

Victoria Veterinary Benevolent Fund

MEETING OF COUNCIL

A meeting of the Council of the Victoria Veterinary Benevolent Fund was held at 10, Red Lion Square, London, W.C.1, on Thursday, June 24th, 1937, when the following members were present: Messrs. H. W. Dawes, G. H. Livesey, J. W. McIntosh, G. P. Male, Mrs. M. Nickinson, Lieut.-Colonel P. J. Simpson, Mr. W. Nairn, Mr. Arnold Spicer, Professor G. H. Wooldridge, Captain W. G. Wragg and Mr. W. Jackson Young.

In the absence of the President, Mr. G. P. Male, Vice-President, was elected to the chair.

The minutes of the previous meeting held on April 7th, 1937, having been published, were taken as read and signed as correct.

Apologies for absence were received from Lieut.-Colonel J. W. Brittlebank, Major F. L. Gooch, Major C. W. Townsend, Captain Sidney Villar and Mr. W. Woods.

Cases

115. Member, aged 72. Old Age Pension. The grant of 7s. 6d. per week was continued.

132. Member, unemployed. The Secretary submitted correspondence in regard to this case, but it was resolved that no action be taken.

158. Widow, aged 45. Application for a grant for spectacles, estimated to cost £2. The Secretary reported that he had received a grant of £1 from the Officers' Association towards the cost, and the application was acceded to.

185. Spinster, aged 63. Correspondence was submitted in this case and the matter was left in the hands of the Executive Committee.

199. Widow, aged 39. Eleven children, aged 14 years to 8 months. It was agreed that the grant of £2 which was formerly paid to the husband be continued to the widow.

204. Widow. Income of £130 a year. No grant was made in this case.

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Treatment of Fractures in the Dog by the use of the Unpadded Plaster Cast

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The main principles of the method are that, having replaced the displaced segments, immobilisation is effected, with the joints in a position midway between flexion and extension to overcome tension, by the application of an unpadded plaster of Paris cast. By this means the pressure is disposed evenly over the whole of the enclosed surface and an effective ecto-skeleton is formed to replace the broken endo-skeleton. Whilst the necessary fixation of the fragments is maintained, many or all of the joints of the limb are given as full a range of movement as is possible, and active movement, even the taking of weight by the limb, is encouraged almost immediately, and thus by overcoming atrophy of bones and muscles, and stiffness of joints, functional restoration is much more rapid.

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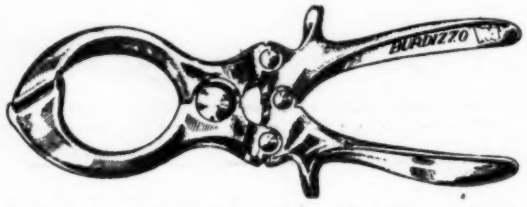

For Lambs, Calves, Bulls, Pigs. No blood. No risk of poisoning. Simple. The patent Dr. Burdizzo Cord Stop feature ensures retention of cord.

Patent knee rest attachment for use with large models frees one hand to hold the cord.

PRICES

Cord Stop Models		Plain Jaw Models	
9 in.	19 in.	8 in.	19 in.
42/6 up to	57/6	32/- up to	53/-

Knee Rest 7/6 extra.

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Principal and Dean: Professor Sir Frederick Hobday, C.M.G., F.R.C.V.S., F.R.S.E., DR. MED. VET. (H.C.) Zurich.

Acting Principal and Acting Dean: Professor J. Basil Buxton, M.A., F.R.C.V.S., D.V.H.

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Secretary's Report

The Secretary submitted the following report, which was approved:—

New and Increased Subscriptions

	£	s.	d.
J. E. Kenny	0	10	6
A. Millar	1	1	0
J. J. O'Donovan	0	10	6
Officers' Association (*re* Mrs. Eady) ...	1	0	0
K. O'Sullivan	0	10	6
Scottish Metropolitan Division (increase of)	5	5	0
J. R. Sheehy	0	10	6
Guy Sutton (special)	100	0	0
	£109	8	0

Donations

	£	s.	d.	£	s.	d.
Collecting Boxes						
Central Veterinary Society	3	3	4			
Derbyshire Veterinary Association	0	16	6			
J. Wright Conchie	0	12	3			
				4	12	1
Midland Counties Veterinary Association				5	0	0
North of England Ladies' Annual Bridge Party				22	0	0
U. F. Richardson (Life Membership) ..				10	10	0
Scottish Metropolitan Division ...				5	5	0
W. W. Smart				1	1	0
Arnold Spicer				30	0	0
				£78	8	1

It was resolved "That the cordial thanks of the Council be conveyed to Major Guy Sutton for so generously passing on to the Fund a cheque for £100 given to him as a thank-offering by a client for his services to a favourite dog, and to the Secretary of the North of England Ladies' Annual Bridge Party for their very generous donation."

Life Membership.—It was unanimously resolved "That Mr. U. F. Richardson be elected a Life Member of the Fund."

Investments.—The Treasurer was authorised to invest the balance in hand in the Donations Account in a suitable security.

FRIESIAN'S GREAT YIELDS

Lavenham Chancery Third, the prize-winning British Friesian cow bred and owned by Messrs. Struth and Parker, of Essex, has given her fifth yield in excess of 2,000 gallons of milk in one year and her second consecutive yield of 3,000 gallons. She is the first English cow with two consecutive 3,000 gallon yields. Britain has only had one other, namely, a Scottish representative of the British Friesian breed.

Born in August, 1925, and due to calve, for the ninth time, at the end of next October, Lavenham Chancery Third produced as follows in her first lactation periods: 1,081, 1,810, 1,010, 2,016, 2,067, 2,275, 3,027 and 3,008 gallons. In the last nine Ministry recording years her yields were 907, 911, 1,358, 1,842, 1,234, 1,908, 1,925, 2,420 and 2,712 gallons.

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Royal Veterinary College

Date of Opening of the New Buildings by the King

We are authorised to state that His Majesty King George VI will visit the Royal Veterinary College, London, on Tuesday, November 9th, for the purpose of opening the new buildings. Further particulars will be announced later.

* * * * *

Bournemouth Congress Number

The next issue of the *Veterinary Record* (August 21st) will be an enlarged and illustrated number largely devoted to the proceedings of the highly-successful Congress held at Bournemouth from July 26th to 30th by the National Veterinary Medical Association. Application for additional copies (price 1s., post free) should be made to the Editorial Representative, N.V.M.A., 36, Gordon Square, W.C.1.

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Personal

Sir John Moore's Retirement from the Editorial Committee, N.V.M.A.

The Editorial Committee, at their meeting on Monday last, learned from Sir John Moore, with much regret, of his intention to relinquish his membership of the committee at the termination of the "Association's year," *i.e.*, in October next: "I feel," he said, "that I have reached the retiring age." Business was suspended while the Chairman (Dr. Wooldridge) and other members voiced their appreciation of Sir John's devoted service to the committee over a long period of years.

Major-General Sir John Moore, K.C.M.G., C.B., F.R.C.V.S., can claim the unrivalled distinction of continuous membership of the Editorial Committee since, in the year 1925, it was reconstituted, as we know it to-day, under the "second reorganisation" of the N.V.M.A. Such a record of assiduous and unremitting effort on behalf of a committee the work of which is of so exacting a nature leaves every member of the Association, and, in particular, Sir John's past and present colleagues on the committee, with a sense of equally unparalleled indebtedness. During that prolonged period, Sir John during the years 1926-1928 and 1930-1934, filled the onerous post of Chairman with much tact and kindliness, and both in and out of the chair he has always set an example in the

important matter of regularity of attendance. His expert knowledge of Service matters, both overseas and at home, has been of great value to the committee, while he has consistently made it his particular care to see that no opportunity is lost by the Association's journal of furthering the interests of the horse and the horse-owner.

. . . . .

On Leave.—The following officers in the Colonial Veterinary Service arrived in this country on leave during July: Mr. G. S. Cowin (Tanganyika), Captain J. L. Stewart (Gold Coast), and Mr. E. G. Prentice (Nigeria).

* * * * *

LEGAL NOTES

Tuberculous Cow Offence.—Giving evidence in a case in which a North Tawton (Devon) farmer was fined £5 and costs for not reporting a cow in which he should have suspected the existence of disease, Mr. D. S. Barbour, the County Veterinary Officer, said the affected animal was an aged cross-bred Devon cow. The hind quarter of its udder was swollen and it must have been in that condition for at least a month. It was obvious that something was wrong with the animal. He conducted a *post-mortem* examination and it was discovered that the udder was tuberculous, and that the animal showed traces of tuberculosis in its lungs and other organs. It constituted a serious case of tuberculosis.

In reply to the Bench, Mr. Barbour said that although defendant would probably not have been able to diagnose that the animal was suffering from tuberculosis, its udder was plainly abnormal, and this fact should have been reported.

Defendant said he had no idea that he was bound to report an abnormality of the udder. He did not know the animal was tuberculous. About 15 months ago it was under treatment by a local veterinary surgeon for udder trouble, and was eventually pronounced by him to be in good condition. The udder was then swollen, but the swelling went down. About three months ago the swelling reappeared, but as the animal had been passed as fit he did not take undue notice of it. The animal was only giving a very small quantity of milk and would have been dry in about a fortnight. Mr. Barbour, in answer to one of the magistrates, said there was a great possibility that tuberculosis from an animal of this nature could be communicated to human beings, especially children. The Order had been in force since 1925, and he thought all milk producers should be conversant with it.

The Chairman said he hoped this case would be an example to others. People who kept cows which were under suspicion of having tuberculosis might be gravely endangering public health.

. . . . .

Sentence of 15 months' imprisonment in the second division was passed at Leeds Assizes recently on George Horne, 38, a bookmaker, of Carr Road, Calverley, near Leeds, for offences in connection with the doping of racing greyhounds at the Greenfield Stadium, Bradford. The jury found Horne guilty on all counts.

EXAMINATION OF POULTRY UNDER THE NEW MARKET REGULATIONS

Our attention has been drawn to a letter published in *Eggs* of July 15th, in which there is recorded a conversation between a poultry keeper and a veterinary surgeon who was examining poultry exposed for sale at a market. The veterinary surgeon is reported to have concluded that some fowls, because of the pale condition of their legs, were in an anaemic condition, and was surprised to find that they handled well. The correspondent asks, "Is a man, who has no idea that a laying bird loses the pigment from her legs, etc., to be allowed to disqualify such birds as unfit for food on the grounds of anaemia?"

It is true that fowls which have been laying well over a period may lose much of the pigment from their legs and other parts of the body and that such birds may be in good bodily condition and free from any disease or condition likely to render them unfit for human consumption. On the other hand, however, paleness of the legs, comb, wattles, etc., often accompanies debilitating conditions and actual disease. It is the veterinary officer's duty to satisfy himself that poultry exposed for sale at markets are fit for human food and, naturally, on observing the conditions referred to he would make a further examination of the birds in question.

* * * * *

ETHICAL PHARMACEUTICALS ASSOCIATION

At the second annual meeting of the Ethical Pharmaceuticals Association, which was held in London, on July 13th, 1937, the Chairman (Mr. A. C. Henry) in reviewing the activities of the Association for the past year, commented on the valuable work that had been carried out on behalf of the members, particularising such matters as the operation of the Poisons Rules and the recommendations of the Select Committee on Medicine Stamp Duties.

The Executive Committee of the Association had given active consideration to various matters of importance to manufacturers and distributors of ethical pharmaceuticals and at all times the facilities of the Association were available to members who enjoyed the services of a staff ready to deal with any enquiries which might come along, and to watch for any movements which might affect the interests represented by the Association. During the year the membership of the Association had increased from 17 to 22.

The following officers were elected: Messrs. A. C. Henry (Chairman), A. W. Edwards (Vice-Chairman), H. R. Napp (Hon. Treasurer), F. G. W. Paige (Secretary).

Executive Committee: Messrs. W. Beckley (Chas. Zimmermann and Co., Ltd., London), H. J. W. France (Roche Products, Ltd., London), J. G. Gordon (Anglo-French Drug Co., Ltd, London), T. F. M. Smart, O.B.E. (Ciba, Ltd., London), S. C. Ritchie (G. W. Carnrick and Co., London), and as *ex-officio* member, Mr. J. Flint (Sandoz Products, London).

The Hon. Auditors (Mr. F. C. Anscombe and Mr. Francis Riddell) were re-elected.

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The recent outbreaks of foot-and-mouth disease near Chester bring this year's total of animals slaughtered through the disease to 3,419. Estimated compensation is £21,381.

VETERINARY OFFICER'S MOTOR ALLOWANCE

Middlesex County Council, at a recent meeting, took steps to rectify the injustice it had unwittingly meted out to its veterinary officer (Mr. R. Wooff) in March, 1935. When Mr. Wooff was appointed, in 1933, an advertised condition of the appointment was that he should have a motor car allowance of £200 per annum. In March, 1935, the County Council revised the motor car scale of allowances. In February, 1937, Mr. Wooff asked that the terms of his original appointment should be reverted to as from April 1st, 1937, as under the new scale he was personally under a considerable financial disadvantage.

In view of the whole of the circumstances the Council decided that Mr. Wooff's allowance should be under the terms of his appointment and to date from February last with an allowance of £200 per annum for a motor car.

* * * * *

TRYPANOSOMIASIS AND CHEMOTHERAPY

Commenting that as recently as the beginning of this century no drug was known that would arrest the progress of sleeping sickness, a writer in a recent issue of the *Lancet* recalls how, in 1905, H. W. Thomas, working at the Runcorn Research Laboratory of the Liverpool School of Tropical Medicine, suggested the therapeutic trial of the French proprietary arsenical, atoxyl, which he had found to have a remarkably trypanocidal action on experimental infections of mice with *Trypanosoma gambiense*. "This suggestion not only offered a new hope but may be said to have given rise to a new industry; for Ehrlich, having examined Thomas's results in Runcorn, returned to Germany and began his great work on the production of arsenicals for the treatment of sleeping sickness and syphilis, and in so doing established the foundations of modern synthetic drug manufacture. The new arsenicals, however, were not without serious defects. Even in moderate doses they often proved highly toxic; their therapeutic action was uncertain in the later stages of the disease and when they failed to cure they readily gave rise to arsenic-resistant strains of trypanosomes; and they were impotent against all stages of infection with *T. rhodesiense*. It was in 1920 that Haendel and Joetten reported on an entirely different trypanocide, Bayer 205. This remarkable product, containing no arsenic, proved to have an astonishingly powerful action on both *T. gambiense* and *T. rhodesiense*, but unfortunately experience showed that it would not bring about cure in the later stages of sleeping sickness—probably because it has a low diffusibility into nervous tissue. In the following year L. Pearce, of the Rockefeller Institute, showed that the new pentavalent arsenical, tryparsamide, just discovered by Jacobs and Heidelberger, had a curative power in the later stages of Gambian sleeping sickness very definitely greater than that of the older arsenicals. Experience confirmed this claim, but in other respects this drug has the disadvantages of its forerunners. Since that time the search for improved compounds has continued, and recent additions to the arsenical armamentarium include the French preparation, orsanine, described by Fourneau and his collaborators in 1923, and the English compound, neocryl, prepared by Morgan and Walton in 1931, and introduced into therapeutics by Yorke and Murgatroyd.[1]

"Hitherto the steps taken to estimate the value of new trypanocides have been as follows. First their action is tested against experimental infections in small laboratory animals in which trypanosomiasis is a readily observed septicaemia. Drugs emerging successfully from this first examination are then tested against experimental infections in larger animals in which the disease is a tissue infection resembling human trypanosomiasis. Finally the more promising compounds are submitted to the crucial test against natural infections of man. Since Bayer 205 is extraordinarily effective in the earlier stages of sleeping sickness the search for new trypanocides has narrowed to the production of compounds that are equally sure and certain in their later stages. Those concerned in the search will, therefore, be interested in a method of estimating the efficiency of drugs used for syphilis or trypanosomiasis of the central nervous system that has lately been described by Hawking, Hennelly and Quastel[2] of the Cardiff City Mental Hospital. At intervals after the administration of various arsenicals to man these workers withdrew cerebro-spinal fluid and estimated its power to kill trypanosomes *in vitro* by means of the technique devised by Yorke and Murgatroyd[3]. Simultaneous chemical determinations were also made of the total arsenic content of the fluids. It was found that after administration of 3·0 grammes of tryparsamide the total arsenic content of the cerebro-spinal fluid, measured chemically, is at a maximum after 14 hours and falls off rapidly during the next 40 hours, whereas the trypanocidal power, measured biologically, while considerable at 14 hours, reached its maximum in 40 hours and became almost inappreciable after 80 hours. At its peak the trypanocidal titre was such that the fluid diluted on an average four to eight times and occasionally 16 to 32 times killed trypanosomes *in vitro* within 24 hours. Now tryparsamide is relatively inert *in vitro*, and if all the arsenic had been present as tryparsamide it could have had no effect upon the trypanosomes. Yorke and Murgatroyd have adduced evidence that the pentavalent arsenicals owe their therapeutic activity to their reduction to the trivalent form, and Hawking, Hennelly and Quastel conclude, therefore, that the trypanocidal activity found in the cerebro-spinal fluid after administration of tryparsamide is due to the reduction of the pentavalent arsenic of the tryparsamide to the active trivalent form; and on somewhat slender evidence they suggest that the active compound is derived from reductions occurring in the brain itself. The trypanocidal activity of the cerebro-spinal fluid bears no definite relationship to the total quantity of arsenic in it, which indicates that the ratio of arsenic present in the trypanocidal trivalent form to the total arsenic present varies from patient to patient (ranging, they find, from 25 per cent. to 1 per cent.). After administration of orsanine similar effects were observed, but the power of this drug to render the cerebro-spinal fluid trypanocidal seemed as great as, if not greater than, that of tryparsamide. This appeared to be due not to its greater penetration but to the larger proportion that was reduced to the active form. On the other hand, the trypanocidal titre of the fluid after administration of neocryl was but slight, and since, judging by the total arsenic determinations, this com-

[1] Yorke, W., and Murgatroyd, F. (1936.) *Brit. Med. J.* **1**. 1042.

[2] Hawking, F., Hennelly, T. J., and Quastel, J. H. (1937.) *J. Pharmacol.* **59**. 157.

[3] Yorke, W., and Murgatroyd, F. (1935.) *Trans. Roy. Soc. Trop. Med. and Hgy.* **28**. 435.

pound reaches the grade, the investigators assume that it fails to be converted into the trypanocidally active condition. This is noteworthy because Yorke, Murgatroyd and others[1] found neocryl apparently beneficial in neurosyphilis, and Lester[1] reported definite improvement in twelve cases of Nigerian sleeping sickness treated with the drug. Murgatroyd has since confirmed this initially beneficial effect in a large number of cases of Gambian sleeping sickness. The explanation of the discrepancy between the laboratory and clinical indications is not obvious. It may be that the original clinical benefits will not be sustained, but it is too early yet to express an opinion on this. In Hawking, Hennelly and Quastel's experiments none of the arsenobenzols examined had an activity in the spinal fluid comparable with tryparsamide or orsanine. In view of this low activity it is somewhat surprising to find that the average arsenic content of the fluids should have been as high as it was; for this class of compound is itself trypanocidally active *in vitro* and does not require any modification by the tissues for its activity, as tryparsamine does. It is suggested that the inactivity of the arsenic in the spinal fluid after a dose of an arsenobenzol is probably due to its conversion to an inactive condition by oxidation or by combination with tissue components.

"This method of examining trypanocidal drugs invites speculation. The original dream that therapeutic action might be linked with and predicted from chemical constitution has only been realised partially, and further advances may well come from the examination and correlation of the physico-chemical properties of existing drugs. Finally it may be observed that modern chemotherapy, though comparatively newly born, has already produced powerful weapons against such deadly diseases as sleeping sickness, syphilis, and other spirochaetoses and leishmaniasis, and is now giving us fresh hope in the contest with bacterial infections. At a time when interest in this science is reawakened it is gratifying to look back upon its international development and to realise how much the peculiar problems of tropical medicine and their study have contributed to its progress."

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ARMY VETERINARY SERVICE

Movements of Officers

Captain A. P. Macdonald and Lieut. J. Hickman left for India on June 26th; the former for transfer to the Continuous Indian Service Cadre, the latter for a tour of duty abroad.

Lieut.-Colonel J. J. M. Soutar, O.B.E., and Major J. P. Hegarty, M.C., are at present in this country on leave ex-Egypt.

Brigadier H. C. Dibben, Lieut.-Colonel G. A. Kelly, Major C. M. Stewart, Major A. J. Kelly, and Captain J. A. Langley, are at present in this country on leave ex-India.

Major H. Bone, M.C., temporarily re-employed retired officer, proceeds from Portsmouth to Aldershot for temporary duty on August 17th.

* * * * *

Professor L. J. Witts, M.D., F.R.C.P., (Professor of Medicine in the University of London and Physician to St. Bartholomew's Hospital), and Professor G. E. Gask, C.M.G., D.S.O., F.R.C.S., (emeritus Professor of Surgery in the University of London), have been appointed members of the Medical Research Council, in succession to Sir Thomas Lewis, C.B.E., M.D., F.R.C.P., F.R.S., and Sir David P. D. Wilkie, O.B.E., F.R.C.S., who retire in rotation on September 30th.

Correspondence

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

* * * * *

CONGENITAL CARDIAC ABNORMALITY IN A CALF

To the Editor of the Veterinary Record

Sir,—I am much interested in the note, as published in your issue of July 31st, on the calf with ectopia cordis described by Mr. J. C. Bennison.

This brings to mind two similar cases which I remember seeing soon after I qualified. The first, a photograph of which I enclose, was brought to the Royal (Dick) Veterinary College, then in Clyde Street, in 1904, and was kept at the College and, if my memory serves me right, was the subject of some controversy as to whether it should be kept alive or killed for the purpose of a *post-mortem* examination.

Calf with abnormal heart. "Dick" Veterinary College, Edinburgh.

The heart, as the photograph shows, was situated at the base of the neck and could be felt plainly and its beats easily ascertained by manipulation. With the exception of being somewhat undergrown the calf seemed otherwise quite healthy. The calf, I was informed, came from a farm somewhere in the north of Scotland and when I returned home from Egypt for my first leave two years later, in 1906, and paid a visit to my old Alma Mater, I found the calf still alive and well. Strangely enough, I remember that there was also another calf with the same abnormality living along with it and I think I am correct in stating that this second calf came from a farm where it was born some 20 miles distant from that on which the first calf was born.

I do not remember what happened to these two animals, but perhaps someone who was then connected with the "Dick" College can enlighten us.

Yours faithfully,

D. S. Rabagliati.

Veterinary Department,
County Hall,
Wakefield.
August 3rd, 1937.